

Nature Conservation in Jordan

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Abstract: The status of nature conservation in Jordan was reviewed based on up-to-date information. Seven nature reserves are currently operating and representing different ecosystems. Objectives and main themes of nature reserves are discussed.

Key words: Jordan, conservation, nature, reserves.

Introduction

The history of early human settlements in the Middle East dates back to Neolithic era. This area witnessed the rise and fall of several civilisations and religions of different origins. Indeed, the mild and seasoned environment of the Middle East was an advantage in the survival of primitive societies since it allowed for hunting and the domestication of animals in their surroundings. The history of wild animals that used to roam our area is well documented on rocks and mosaic (HATOUGH-BOURAN & DISI 1991). Images of lions, gazelles, ibex and other carnivores covered the walls of desert palaces in the Jordanian deserts and churches in Madaba that reflect the ancient past of these animals.

Despite the limited area of Jordan, this country enjoys four distinct biogeographical zones (Mediterranean, Irano-Turanean, Sahara-Arabian and Afrotropical). Within their wilderness, several animals and plants thrived over the centuries. Little is known about the relationships of the first societies with the animals living within their proximity. However, much information can be found on later civilisations of the area, namely Islamic and Arabic civilisation that dominated the area for over 14 centuries (AMR & QUATRAMEEZ 2002).

Nature conservation in Jordan represents a challenge that was met by a great success. Efforts over the past 40 years to conserve the flora, fauna and ecosystems of

Jordan resulted in foundation of seven operating nature reserves and re-introduction of extinct species. At present 27 local non-governmental organisations (NGO) as well as international agencies are stationed in Jordan. The Royal Society for the Conservation of Nature (RSCN) is the only NGO with a mandate from the government of Jordan entitled to establish, manage and operate nature reserves in Jordan. Additionally, RSCN is the legal body that takes full responsibilities for managing wildlife protection through enforcing wildlife protection laws and CITES, hunting monitoring and control.

In this essay efforts undertaken to protect the wildlife in Jordan and the current status of nature conservation are discussed.

Nature Conservation in Jordan

In 1922, the first conservation act was declared to emphasise the crucial need for the conservation of Jordan's forest and rangelands. At present a network of 23 forest and rangeland reserves have been declared and established, representing various habitats throughout the country. In 1965, the Late King HUSSEIN requested that the government establish a national program for the conservation of nature to include designated protected areas. Azraq National Park was the first to deal with wildlife reserves in Jordan (MOUNTFORD 1965, NELSON 1973). Since then the Royal Society for the Conservation of Nature with the legal and logis-

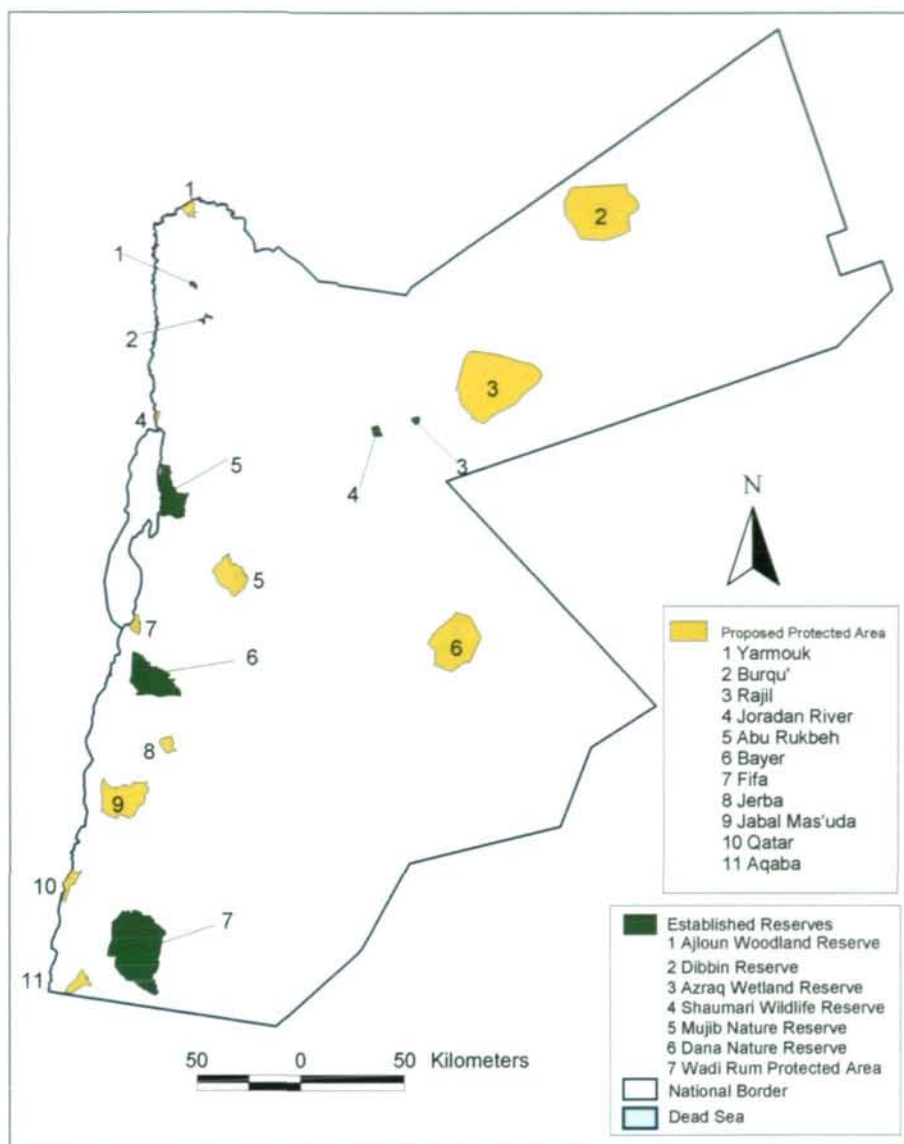


Fig. 1: Locations of proposed and operating nature reserves in Jordan.

tic support of the government of Jordan, was assigned the role of managing nature reserves and wildlife conservation (AMR & QUATRAMEEZ 2002).

The philosophy of nature conservation in Jordan stems from the alarming decline of the natural heritage (animal and plants) witnessed during the beginning 20th century (AMR 2000). Several large mammals such as the oryx, the dorcas gazelle, the mountain gazelle, the goitered gazelle, and the Mesopotamian fallow deer are either extinct or endangered (QUMSIYEH et al. 1996). Other carnivores including the Asiatic cheetah, the Arabian leopard, and the caracal are either extinct or in critical status (QUMSIYEH et al. 1993). Birds of prey, the ostrich and the hubara bustard are also threatened or locally extinct.

So far, twelve wildlife reserves are either proposed, under establishment, or have been established (Fig. 1). Basically, these reserves serve as sites for reintroduction programs of locally extinct animals. Additionally, these sites harbour unique animal and plant communities, which are distributed all over the country.

With the recent advances in the concept of biological diversity, the philosophy of conservation extends to serve and upgrade the socio-economic status of the locals (AMR & QUATRAMEEZ 2002). A partnership between the RSCN and the locals within the proximity of these reserves was initiated. This partnership yielded a common understanding of the importance of biodiversity and conservation by the locals. Money generating projects such as jewellery handicrafts, herbal tea, naturally processed food, as well as ecotourism enhanced the wellbeing of the surrounding communities. Indeed, Dana Nature Reserve is an ideal example of the positive partnership between the RSCN and locals.

The government of Jordan participated in several global conventions pertinent to the protection of wildlife and conservation issues. About 33 international and three regional conventions were drafted and ratified.

At present, eighteen acts and eight regulations include provisions on environmental protection. These laws and regulations are enforced through different governmental and non-governmental agencies. As far as nature conservation and wildlife protection goes, Agricultural Law No. 44 of 2002, Aqaba Region Authority law No. 32 of 2000 and the Law of Environmental Protection No. 1 of 2003 are in effect. Articles in these laws include protection of birds and wild animals and their hunting regulations, designate co-operation between different governmental agencies with competent authorities, assign responsibilities and power to enforcing the different articles, and distribution of the financial resources and available funds among agencies (ANONYMUS 1998).

The legal framework body that embraces all environmental issues in Jordan was assigned to The Ministry of Environment (MOE). MOE has been established in 2002, to replace the General Corporation for Pro-

tection of the Environment. MOE has administrative and financial independence, and has the right to act in all legal procedures. It aims to promote protection of the environment and the improvement of its various elements and the execution of this policy in co-operation with the relevant authorities.

Under the MOE supervision, several international and national programmes were executed. The Country Study on Biological Diversity stands out as one of the best contributions, that revealed the different components of biological diversity in Jordan. A monumental study discussing the various aspects and the infrastructure of diversity in Jordan was published in 1998, where the first author had the honour of being a member of the task force. This document provides the base-line data on available natural resources for policy and decision makers.

Status of Nature Reserves in Jordan

Through the co-operative efforts of the Jordanian government, RSCN and a number of international agencies, a total of seven managed nature reserves are in operation, with a total area of 1124 square kilometres (Fig. 1). The main objectives for these nature reserves focus on the conservation and management of the natural and cultural resources for each reserve, promoting sustainable development of these habitats and their resources, and increasing public awareness of the value of biological and cultural resources (AMR & QUATRAMEEZ 2002).

Additionally, the RSCN, with generous funding provided by the United Nations Development Program, assigned 27 important bird areas (IBA) in Jordan. These sites cover the Jordan Valley, the eastern mountains, Wadi Araba and the eastern desert. Extensive studies focused, on the fauna and flora of the IBA, resulted in the identification of the status for most of the birds residing in these areas. The intention of identifying the IBA is to conserve and, later, manage these sites and incorporate them in a nature reserve network.

The experience acquired by the RSCN is shared by other Arab countries in the

Middle East. Capacity building for promoting management of nature reserve, and institution capacity building the governments for Syria, Lebanon, Palestine, Yemen, and Saudi Arabia was disseminated through workshops and active field research. The Jordanian experience in nature conservation stands as living example for the surrounding countries.

A total of 23 forest and rangeland reserves have been established since 1946-1992. The Ministry of Agriculture manages these reserves. Recreation and local tourism are mostly the main function for these areas. Further management plans and development are urgently needed to protect and conserve these forests and rangelands.

Nature Reserves

Shaumari Reserve (Fig. 2, 3)

This reserve was established in 1975. It lies within the Saharo-Arabian zone and is represented by the hammada vegetation type. It occupies a total area of 22 km². Shaumari Reserve is a flat gravelly area penetrated by a medium-sized wadi that floods in wintertime. The main objective of Shaumari Reserve is the reintroduction and breeding of the Arabian oryx, Syrian ostrich and the Syrian wild ass.

The vegetation is dominated by *Atriplex halimus*, *Retama raetam* and *Haloxylon salicornicum*. 193 plants species were recorded in the reserve. Six carnivore species were recorded in Shaumari Wildlife Reserve. *Canis aureus*, *Canis lupus*, *Caracal caracal*, *Felis silvestris*, *Vulpes vulpes* and *Hyaena hyaena*.

Oryx have been successfully reintroduced to Jordan in 1978 (FITTER 1984; LAMB 1984; NELSON 1985; HATOUGH & AL-EISAWI 1987). In 1995, the herd numbered about 176 heads and was held within a 20 km² enclosure. The RSCN donated several animals to Syria, Saudi Arabia and United Arab Emirates. A small herd was released in Rum Protected Area in 2002.

Breeding birds include; Thick billed lark (rare), Temminck's Horned Lark, Hoopoe Lark, Creamed-coloured-Courser, Desert Wheatear, Red-rumped Wheatear (rare), Desert finch and formally Houbara Bustard.



Fig. 2: Landscape of Shaumari Reserve showing the common vegetation of *Atriplex*.



Fig. 3: The Arabian oryx is flourishing in Shumari Reserve after it was introduced in 1978.

Winter visitors include Imperial Eagle, Steppe Buzzard, Cranes, and finches Wheatear. During migration, Lesser Kestrel, Levant Sparrow Hawk, Steppe Buzzard, Red-breasted Flycatcher (autumn), and Cyprus Wheatear were recorded (CLARKE 1980).

Azraq Wetland Reserve (Fig. 4, 5)

It lies within the Saharo-Arabian biogeographical zone and is represented by the Hammada vegetation type in most of the area and a small part of the Qa vegetation type in the eastern part of the reserve. Azraq Wetland Reserve was established in 1977, with a total area of 12 km². The reserve is a silt dune area with some area of open water, marshes and part of a depression. Major plant species in the area are *Tamarix passeri-*

noides, *Nitraria retusa*, *Phragmites australis* and *Halopeplis amplexicaulis*. Around 150 species of vascular plants have been recorded in the reserve. 2 species are new to science: *Asparagus* sp. and *Schanginia* sp. while at least 5 species are globally rare.

The main objective of this wetland reserve is to protect migratory birds and conserve wetland habitats. A large number of migrant and wintering wildfowl and waders use the Oasis. Purple Heron, Water rail, Little Ringed Plover, Kentish plover, Marbled Teal, Black winged Stilt, Avocet, Little Tern, Namaqua Dove, and Desert wheatear can be seen irregularly wintering in the Oasis. Other species can be seen wintering or passing through the Oasis such as, Little Grebe, Cormorant, Bittern, Little Bittern,



Fig. 4: This is the only wet land reserve in Jordan. Azraq is located on the migratory rout of several birds originating from Europe and Africa.



Fig. 5: Landscape of Azraq Wetland Reserve. Thick vegetation of *Typha* provides a shelter for many birds.

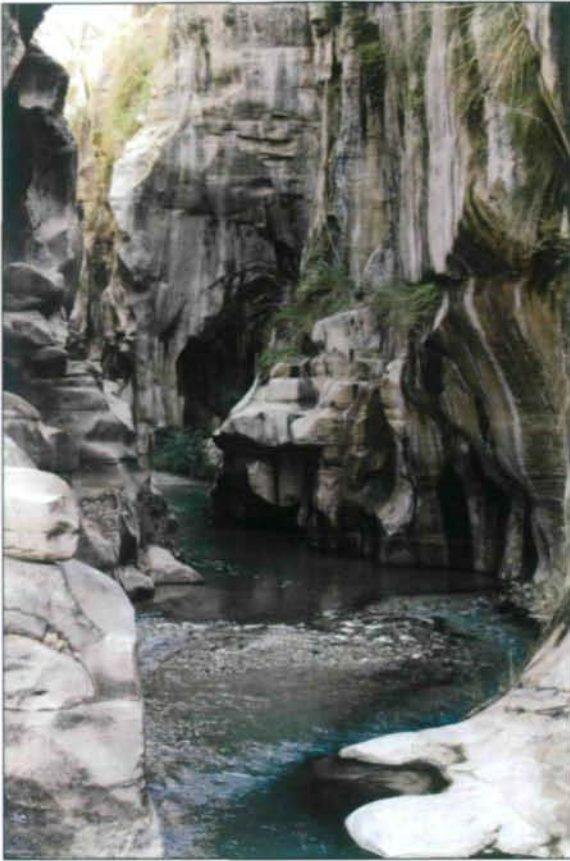


Fig. 6: Mujib River gushes very fast to the Dead Sea. The wadi system is very unique in its geological formation.

Fig. 7: Mujib Nature Reserve is the major captive breeding reserve for the Nubian ibex, *Capra ibex*.

Squacco Heron, Greater flamingo, Ruddy Shelduck, Shelduck, Wigeon, Teal, and several waders (NELSON 1973, CONDER 1981, WALLACE 1982, 1983).

This reserve is the only breeding location for the endemic fish, *Aphanius sirhani* (KRUPP & SCHNEIDER 1989). Several species of terrestrial arthropods and dragonflies have been recorded from this reserve (AMR et al. 1997). Large mammals such as the Asiatic jackal, striped hyena have been recorded (NELSON 1973).

Mujib Nature Reserve (Fig. 6,7)

It lies within two biogeographical zones, the Irano-Turanian in the eastern parts and the Sudanian in the western parts and along the Dead Sea. It was established in 1987 and occupies an area of 218 km². Mujib Nature Reserve occurs at the eastern side of the Rift Valley along the Dead Sea. Sharp edges and cliffs with different altitudes of Paleozoic sandstone mountains at the lower altitudes and Mesozoic limestone at the higher altitudes dominate the area. The reserve is influenced by three biogeographic regions; the Irano-Turanian, Saharo Arabian which,

dominates the reserve and the Sudanian penetration region. *Retama raetam*, *Artemisia sieberi*, *Moringa peregrina*, *Salvia dominica*, and *Rhus tripartita* are the dominant vegetation in the reserve. Four different vegetation types are represented in this reserve; steppe, tropical, saline and aquatic vegetation. 412 plant species have been recorded in the reserve during the first baseline survey 1996, 4 are considered new records to the flora to Jordan.

Mujib River crosses the reserve with a magnificent flow into the Dead Sea. Besides being a nature reserve, this area has a breathtaking natural beauty. The Mujib gorge descend from the mountains into the Dead Sea through a series of waterfalls.

Breeding birds occurring at MNR include; Bonelli's Eagle, Barbary Falcon, Eagle Owl, Hume's Tawny Owl, Arabian Babbler, Palestine Sunbird, White-breasted Kingfisher, Morning, Hooded, and White crowned Black wheatears in addition to the unique Black morph Morning Wheatear, and Trum-peter Finch are breeding birds that can be seen in Mujib Reserve. Two colonies of Lesser Kestrel were observed in MNR, and



Fig. 8: Forests of juniper in Dana Nature Reserve.



Fig. 9: Landscape showing the Wadi Araba part of Dana Nature Reserve. The mountain series gradually decline to join the Wadi Araba desert.

the Stone Curlew, Pallid swift, Alpine Swift, Rock Thrush, and Ortolan Bunting are migrant birds that can be seen during migration season. The main purpose for this reserve is the breeding of the Nubian Ibex (*Capra ibex*). Several species of carnivores have been recorded such as the hyenas, the caracal, Blanford's fox and the honey badger (ABU BAKER et al. 2004).

Dana Nature Reserve (Fig. 8, 9)

The Dana Nature Reserve is located at 30°40'N, 35°30'E. It was declared as an operating nature reserve in 1990. It features a system of wadis and mountains extending from the Sharrah mountains in the east, to the desert lowlands of Wadi Araba in the west. Rocks are predominantly limestone and sandstone and are covered with weathered material. Flow in the wadis can reach 2m in some years with flood waters discharging gravel in the wadi floors and out along alluvial fans to the west. Altitude ranges from 1500m in the east to 200m below sea level in the west. The southern part of the reserve is dominated by Wadi Dana which features 1000m cliffs incised with tributary wadis and a stream fed by four or more springs. Mean annual rainfall is 315mm with mean daily potential evaporation of 3,68mm. The reserve is currently 325 km² in area. It lies within three different biogeographical zones they are from east to west: Mediterranean, Irano-Turanian and Sudanian.

The reserve includes four different types of ecosystems according to the vegetation types; Sand dune desert with xerophytic shrubs (*Haloxylon persicum*, *Hammada scopyr*), Acacia sub-tropical vegetation dominated by *Acacia raddiana*, *Acacia tortilis* and *Ziziphus spina-christi*, Irano-Turnian mid-altitude steppe characterised by *Artemisia herba-alba*, *Retama raetam*, *Anabasis articulata*, and other low shrubs, and Mediterranean semi-arid dominated by *Juniperus phoenicia* and at higher altitude, *Pistacia atlantica* and *Quercus coccifera*. 555 species of vascular plants were recorded in Dana in the first baseline in 1994. The number reaches now to around 700 species of 71 families. The most important tree species is the Cypress, *Cupressus sempervirens*, they represent the last remaining stands in the region. Three species considered as new to science were described from Dana; *Silene danaensis*, *Rubia danaensis* and *Micromeria danaensis* (AVINOAM 1997).

190 species of birds have been recorded in the reserve including breeding raptors like Griffon Vulture, Short-toad Eagle, Verreaux's Eagle, Bonelli's Eagle, and Barbary Falcon. Hume's Tawny Owl also occurred. Other species like Isabelline and Hooded Wheatear, Dunn's, Bar-tailed and Short-tailed Larks, woodlark, Arabian, Upcher's, and Orphean Warbler can be seen in different parts of the reserve. Other mammals include the wild cat, the caracal, the crested porcupine, the hyena, the Asiatic jackal, Blanford fox, and Arabian ibex (AMR et al. 1996).



Fig. 10: Introduced roe deer in Ajloun Reserve.



Fig. 11: Spring in Ajloun Nature Reserve. This reserve is thickly covered by ever green oak, *Quercus calliprinos*.

By far, Dana Nature Reserve is considered the jewel of all nature reserves. It is not only the scenery and nature, but also the great success in implementing socio-economic development and partnership with the locals. This reserve is a model for perfect harmony between people and nature.

Ajloun Reserve (Fig. 10, 11)

The reserve lies within the Mediterranean zone and is mainly covered by ever green oak, *Quercus calliprinos*. It is a mountainous area penetrated by some wadis without any source of permanent water. It is mainly covered with *Quercus calliprinos*, *Pistacia palaestina* and *Arbutus andrachne*. 190 floral species were recorded in the reserve including trees, shrubs, annual and perennial plants in addition to corals and ferns. Four species are listed on the CITES appendices: *Cephalanthera longifolia*, *Ophrys transhyrcana*, *Orchis anatolica* and *Orchis tridentata*. The total area is about 13 km² and was established in 1988. The main objectives of Ajloun Reserve are to conserve natural Mediterranean forests and reintroduction of the roe deer. In 1988, two males and two females from the Turkish-Bulgarian border were donated by the Turkish Government. By 1995, 12 individuals were surviving in this reserve (QUMSIYEH et al. 1996).

Migrant bird species include Black Kite, Egyptian Vulture, Sparrow Hawk, and Short-toad Eagle. Chukar, Wren, Rufous Nightingale, Rock Thrush, Sardinian Warbler, Blue Tit, Great Tit, and Cretzschmar's

Bunting are common species within the reserve. Other wildlife aspects include the Roe Deer and Stone Martin.

Wadi Rum Protected Area (Fig. 12, 13)

Wadi Rum area is characterised by the dominance of very steep-sided, high mountain ridges with flat or rounded tops of the Rum sandstone group, separated by wide, flat-bottomed and sandy wadis and sand plains. The area is under the influence of the Sudanian biogeographical region (Sudanian penetration). Rum area has a dry desert type of climate with very hot summers and relatively mild, warm winters. The sand dune vegetation type is the dominant vegetation in the area represented mainly by *Haloxylon persicum*. The northern part of the reserve comprises a five-wadi system running north to south, parallel to each other. These are Wadi el Marsad, Wadi Rumman, Wadi Rum, Wadi Um Ishrin and Wadi Um Harraq. The western, central and southern parts of the area are dominated by crystalline rocks of the ranted basement and are typified by rugged mountain ranges and undulating hills and ridges separated by wide, generally flat-bottomed wadis. The total area of this reserve is 560 km. The main objectives for this reserve are to conserve the natural scenery of this desert habitat, protect archaeological and historical sites present in the area, develop ecotourism, enhance the socio-economic status for the locals and conserve and protect the biological diversity within its borders.



Fig. 12: Landscape of Wadi Rum Protected Area.



Fig 13: A view in wadi Rum showing the Seven Pillars of Wisdom mountain.

A total of 183 plant species were recorded within the protected area in the baseline flora survey in 1999 and was update in the year 2000. These plants belong to 152 genera and 49 families. The plants were identified as follows: 2 new records to Jordan, 4 ferns, 13 poisonous, 15 rare, 6 endemic, 11 edible, 5 ornamental, 32 medicinal and 57 common species. The two new records are *Satureja thymbriifolia* and *Gagea dayana*. BAR-SOTTI et al. (2000) described the new species, *Neurada al-eisawii* from Rum. Important flora in the area also includes; *Haloxylon salicornicum*, *Anabasis articulata*, *Juniperus phoenicea* and *Ficus pseudo-sycomorus*.

Breeding pair of Verreaux's Eagle. Other raptors like Lesser-Spotted Eagle, Booted Eagle, Osprey, Lesser Kestrel, and Red-footed Falcon can be seen during their passage in spring and autumn. Other species like Hoopoe Lark, Temminck's Horned Lark, Tawny Pipit, Thrush Nightingale, Blue Throat, Red-tailed Wheatear, Rock Thrush, Savi's Warbler, Cyprus Warbler, Willow Warbler, Ortolan Bunting, and Cretzschmar's Bunting were recorded (EVANS et al. in print).

Dibben Nature Reserve (Fig. 14, 15)

The area lies within the Mediterranean bio-geographical zone, and three different vegetation types are present within it. The Evergreen oak forest, the Mediterranean non-forest and the Aleppo pine forest vegetation types. The reserve is a mountainous area reaching an altitude of 1100m above

sea level, with a number of small and medium-sized wadis.

The dominant species within the sites are, *Pinus halepensis*, *Quercus calliprinos*, *Q. infectoria*, *Cistus villosus*, *C. salvaefolius* and with a several species of orchids. Breeding birds includes Short-toad Eagle, hobby, Tawny Owl, Syrian Woodpecker, Wren, Palestine Sunbird, Bonelli's Warbler, and Blue Tit. Other mammals such as the Persian squirrel, the Stone Martin are common.

Discussion

Until now, the concept of conserving diversity is still obscure to many decision makers in Jordan. The broad spectrum of biological diversity requires trained individuals to reveal its importance for the country in various aspects; socio-economic, ecotourism, scenic and ethical perspectives.

On the other hand, Jordan witnessed tremendous investment in wildlife conservation, which is exemplified with the emergence of several non-governmental organisations with emphasis on various aspects of environmental issues. Indeed, over 10 NGOs are tackling with environmental issues including wildlife conservation, reintroduction programs, public awareness, pollution, and other related problems.

Public awareness of the importance of conservation is a high priority issue. The role of these NGOs is to address wildlife conservation to various sectors of the community, mainly children and youngsters, as



Fig. 14: Forests of pine mixed with oak in Dibben Nature Reserve.



Fig. 15: Thick natural forests of *Pinus halepensis* in Dibben.

well as to rally support from decision makers. Through the collaboration of the RSCN and the Ministry of Education, over 1000 Nature Preservation Clubs were established in schools all over Jordan. These clubs aim to introduce the value and ethics of respecting nature and to orient the students into nature-loving generation.

With the limited resources of Jordan, sustainable development of its natural heritage (archaeological, cultural, landscape and biodiversity) can provide a decent income for many sectors of the Jordanian society. Our fragile natural resources are in dire need to be managed in environmentally sustainable means. The concept of sustainable development is the keyword for the future of nature conservation in Jordan. As indicated earlier, conveying the importance of nature and biodiversity to the public will certainly lead to a common understanding and dedication.

Status of the Fauna and Flora of Jordan

Fauna

A total of 78 species of mammals has been recorded from Jordan (AMR 2000). The decline in Jordan's wildlife was mainly in its large mammals, Artiodactylia and Carnivora, within the past 300 years (QUMSIYEH et al. 1994, 1996). Table 1 summarizes extinct species from Jordan over the past centuries.

Other species are threatened such as the Rock Hyrax, *Procavia capensis*, the Persian

Squirrel, *Sciurus anomalus*, the African Honey Badger, *Mellivora capensis*, the Eurasian Badger, *Meles meles*, Indian crested porcupine, *Hystrix indica*, Dorcas Gazelle, *Gazella dorcas*, Goitred Gazelle, *Gazella subgutturosa marica*, Nubian Ibex, *Capra ibex nubiana*, Blanford's Fox, *Vulpes cana*, Caracal, *Caracal caracal*, Common Otter, *Lutra lutra*, and the Arabian Wolf, *Canis lupus arabs*, Stone Marten, *Martes foina* and others.

At present, about 400 species of birds have been recorded from different habitats in Jordan. 50% of Jordan's avifauna is predominantly migratory. At least 11 species are considered to be endangered (table 2). The Syrian Desert Ostrich, *Struthio camelus syriacus*, the biggest non-flying bird on earth has been extinct in Jordan around the late thirties.

90 species of amphibians and reptiles are known to occur in Jordan. Four species of amphibians are surviving, however, the Syrian Spadefoot, *Pleobates syriacus*, was not recorded for the past 30 years and may have become extinct. Several species of reptiles are considered endangered or threatened locally and globally such as; the European Chameleon, *Chamaeleo chamaeleon*, the Spiny-tailed lizard, *Uromastix aegyptia*, the Desert monitor, *Varanus griseus*, and the Mediterranean Spur-thighed Tortoise, *Testudo graeca*.

Table 1: Extinct species of large mammals from the last 120 years

Common Name	Scientific Name
Syrian wild Ass	<i>Equus hemionus</i> spp.
Oryx	<i>Oryx leucoryx</i>
Roe deer	<i>Capreolus capreolus</i>
Persian fallow deer	<i>Dama mesopotamica</i>
Syrian Ostrich	<i>Struthio camelus</i> spp.
Arabian leopard	<i>Panthera pardus nimr</i>

Table 2: Endangered birds in Jordan

Common Name	Scientific Name
Pin-tailed Sand grouse	<i>Pterocles alchata</i>
Coot	<i>Fulica atra</i>
Sand Partridge	<i>Ammoperdix heyi</i>
Houbara Bustard	<i>Chlamydotis undulata</i>
Mall	<i>Anas platyrhynchos</i>
White Stork	<i>Ciconia ciconia</i>
Stone Curlew	<i>Burhinus oedicnemus</i>
Chukar Partridge	<i>Alectoris chukar</i>
Peregrine Falcon	<i>Falco peregrinus</i>
Black or Francolin Partridge	<i>Francolinus francolinus</i>
Griffon Vulture	<i>Gyps fulvus</i>

Fig. 16: The Black Iris, *Iris nigricans*, is the national flower of Jordan. This Iris in addition to about 20 other Iris species are considered.



Flora

The total number of plant species is estimated to be between 2300 and 2400, of which 2000 are vascular plants. It is estimated that about 100 species are endemic, 200 to 250 are rare species, 100 to 150 are threatened and 10 to 20 have gone extinct over the last ninety years (ANONYMUS 1998). Extinction is mainly due to habitat encroachment by urban and agricultural development, deforestation, deterioration of range lands by over grazing and soil erosion, and depletion of the major water resources.

Examples of some endemic plant species in Jordan: *Crocus moabiticus*, *Iris petraea*, *Iris nigricans* (Fig. 16), *Iris edomensis*, *Iris postii*, *Iris vartani*, *Colchicum tunicatum*, *Diplotaxis villosa*, *Cousinia austrojordanica* Kickxia azraqensis, *Alyssum spinosum*, *Haplophylum poorei*, *Verbascum transjordanicum* and *Ferula sinaica*.

Examples of some rare plant species in Jordan: *Opoponax hispidum*, *Smyrniolum conatum*, *Scandix palaestina*, *Seetzenia lanata*, *Atraphaxis spinosa*, *Ducrosia flabellifolia*, *Zoegea purpurea*, *Lappula barbata*, *Cytinus hypocistis*, *Daucus jordanicus*, *Biarum eximium*, *Scandix turgida*.

Examples of some endangered plant species in Jordan: *Epipactis veratrifolia*, *Ophrys sphegodes*, *Ophrys transjordanica*, *Ophrys apifera*, *Ophrys oestrifera*, *Himantoglossum affine*, *Orchis simia*, *Orchis sancta*, *Orchis purc-tata*, *Capparis decidua*.

Examples of some extinct plant species in Jordan: *Anacamptis pyramidalis*, *Orchis laxiflora*, *Ophrys vernixia*, *Abutilon indicum*, *Avicennia marina*, *Hyphaene thebaica*.

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Zusammenfassung

Naturschutz in Jordanien. Die Situation des Naturschutzes in Jordanien wird durch aktuelle Information dargestellt. Derzeit existieren 7 Naturschutzgebiete, welche die verschiedenen Ökosysteme repräsentieren. Ziele und Inhalte der Naturschutzgebiete werden diskutiert.

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